



CORPORATE - POCATELLO OFFICE

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EPA-Lab is reviewing proposed methods 3/6/15 Done

March 5, 2015

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**Subject: Smoky Canyon Mine Surface Water and Groundwater Monitoring Programs  
Updated EPA Laboratory Methods**

Dear Mary, et al,

In an effort to streamline the surface water and groundwater monitoring programs at the Smoky Canyon Mine, Simplot is requesting agency approval to implement updated EPA laboratory methods effective April 2015. This proposed change is designed to simplify and unify the analytical requirements under the various monitoring programs. The updated laboratory methods are from EPA's SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. One set of updated laboratory methods for surface water and groundwater monitoring programs are proposed to replace the older, outdated methods that have been in place at Smoky Canyon Mine under a variety of monitoring plans including the 2009 Sampling and Analysis Plan for the Remedial Investigation/Feasibility Study (RI/FS). These updated methods were presented in the RI/FS Sampling and Analysis Plan (SAP) Addendum 06 which was submitted to the agencies in November 2014 but has not yet been approved and are also the same methods currently used for analysis of samples collected under the East Smoky Panel Mine EIS.

Table 1 (attached) lists the analytes for groundwater and surface water monitoring at the mine, including current (outdated) laboratory methods and the updated methods. A listing of monitoring program plans affected by this request is also shown in Table 1, along with key agencies responsible for each program.



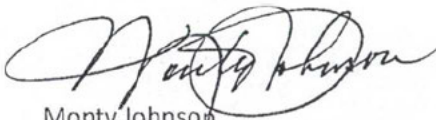
Updated EPA Lab Methods  
Mary Kauffman, et al  
March 5, 2015  
Page 2

Your timely review and approval will enable Simplot to start implementing the updated laboratory methods for the 2015 spring high-flow monitoring event. Furthermore, your approval will facilitate an efficient process for updating a number of monitoring plans including the Comprehensive Environmental Monitoring Program Plan (CEMPP), Panels B and C Water Quality Monitoring Plan (WQMP), the Pole Canyon 2006 Non-Time-Critical Removal Action (NTCRA) Effectiveness Monitoring Plan (EMP), and others requiring revisions to address other monitoring program changes.

To implement these updated laboratory methods for the spring high-flow monitoring event, we request your concurrence by the end of March 2015. Upon your approval, Simplot will distribute documentation of the updated laboratory methods to all users of the RI/FS QAPP and QA/QC documents for other monitoring programs at the Smoky Canyon Mine.

We look forward to your response. Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Monty Johnson", is written over a circular stamp or seal.

Monty Johnson  
Environmental Engineering Manager

Enclosure: Table 1. Proposed Revisions to Laboratory Methods, Smoky Canyon Mine Monitoring Programs

cc: Chad Gentry, Simplot  
Burl Ackerman, Simplot  
Lori Hamman, Simplot  
Fred Charles, Formation Environmental



Table 1. Proposed Revisions to Laboratory Methods, Smoky Canyon Mine Monitoring Programs

**GROUNDWATER**

Analyte(s)	Current Method	Proposed Replacement Method
Metals (total and dissolved)	EPA 200.7 or EPA 6010B	EPA 6010C
Metals (total and dissolved)	EPA 200.8 or EPA 6020	EPA 6020A
Mercury (total and dissolved)	EPA 7470A	EPA 7470A (no change)
Selenium (total and dissolved)	SM 3114C	EPA 6020A
Chloride, Fluoride, Sulfate	EPA 300.0	EPA 300.0 (no change)
Alkalinity (HCO <sub>3</sub> , CO <sub>3</sub> , OH)	SM 2320	SM 2320 (no change)
NO <sub>2</sub> +NO <sub>3</sub> as N	EPA 353.2	EPA 353.2 (no change)
TDS, TSS	SM 2540C/D	SM 2540C/D (no change)
Total Phosphorous	4500PE	4500PE (no change)
TOC	SM 5310B	SM 5310B (no change)

**SURFACE WATER**

Analyte(s)	Current Method	Proposed Replacement Method
Metals (total and dissolved)	EPA 200.7 or EPA 6010B	EPA 6010C
Metals (total and dissolved)	EPA 200.8 or EPA 6020	EPA 6020A
Mercury (total and dissolved)	EPA 7470A	EPA 7470A (no change)
Selenium (total and dissolved)	SM 3114C	EPA 6020A
Chloride, Sulfate	EPA 300.0	EPA 300.0 (no change)
Alkalinity (HCO <sub>3</sub> , CO <sub>3</sub> , OH)	SM 2320	SM 2320 (no change)
Hardness	EPA 200.7 calc or EPA 6010C calc	EPA 6010C calc
NO <sub>2</sub> +NO <sub>3</sub> as N	EPA 353.2	EPA 353.2 (no change)
TDS, TSS	SM 2540C/D	SM 2540C/D (no change)
TOC	SM 5310B	SM 5310B (no change)

**Plans covering groundwater and/or surface water:**

Title:	Date:	Agencies:
Comprehensive Environmental Monitoring Program Plan (CEMPP), Revision No. 2	September 2012	BLM, USFS, IDEQ
RI/FS Sampling and Analysis Plan (SAP)	June 2010 and subsequent SAP addenda	USFS, USEPA, IDEQ
RI/FS Pilot Study Work Plan and SAP, Semi-Passive Biological Treatment Technology at DS-7	December 2011 (conducted under the RI/FS)	USFS, USEPA, IDEQ
Pole Canyon 2006 Non-Time-Critical Removal Action (NTCRA) Effectiveness Monitoring Plan (EMP), Revision No. 3	June 2011	USFS, USEPA, IDEQ
Pole Canyon 2013 NTCRA Effectiveness Monitoring Plan (EMP)	to be prepared after construction	USFS, IDEQ, Tribes
Operations and Abandonment Plan for the Smoky Canyon Mine Tailings Impoundments	February 2005 and March 2014 Amendment	IDEQ, IDWR, IDL, USEPA, USFWS
Water Quality Monitoring Plan (WQMP) for Smoky Canyon Mine Panels B and C	April 2002	IDEQ
Panels F and G IDEQ Consent Order Water Quality Monitoring Plan	January 2008	IDEQ
Industrial Well Corrective Action Plan (CAP)	December 2011	IDEQ
Industrial Well CAP Interim Status Report	August 2012	IDEQ
Culinary Water Supply Well Monitoring Plan	September 2012	IDEQ



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CORPORATE – POCATELLO OFFICE

November 24, 2014

US EPA  
NOV 26 2014

Mary Kauffman  
USDA Forest Service – Caribou National Forest  
410 East Hooper Street  
Soda Springs, Idaho 83276

IDAHO OPERATIONS OFFICE

**Subject: Smoky Canyon Mine Remedial Investigation/Feasibility Study  
(RI/FS) Final Sampling and Analysis Plan (SAP)  
Addendum 06 – Updated EPA Laboratory Methods**

Dear Mary:

Please find enclosed one unbound hardcopy of Addendum 06 to the Final Sampling and Analysis Plan (SAP) for the Smoky Canyon RI/FS. The J.R. Simplot Company (Simplot) is submitting the enclosed set of revised tables in accordance with the August 2009 Settlement Agreement/Consent Order.

SAP Addendum 06 provides revised tables for the RI/FS Quality Assurance Project Plan (QAPP). The enclosed tables (SAP/QAPP Tables 2-2, 2-3, 2-7, 2-8, 2-9, 2-10, 2-11, and 2-12) were revised to reference updated laboratory methods from EPA's SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* and to be consistent with updated screening-level information provided in the Final RI Report. These tables are intended to replace the corresponding tables in the SAP/QAPP, including those presented in the Final SAP (June 2010) and SAP Addenda 01 (May 2011) and 03 (October 2011). Upon your approval of the enclosed tables, the updated method numbers referenced therein will supersede the previous, now outdated, SW-846 method number references throughout the QAPP.

With your approval, Simplot will distribute SAP Addendum 06 to all users of the RI/FS QAPP, including the consultants and contracted laboratories that participate in environmental data collection for the Smoky Canyon Mine RI/FS. We look forward to your response.

The enclosed CD provides SAP Addendum 06 along with previous addenda and the entire SAP. The CD includes revised Standard Operating Procedure (SOP) for SAP Addendum 05 (submitted concurrently).

November 24, 2014

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The electronic files are available for download at:

<https://smokyribs.formationclient.com/>

Username: (b) (6)

Password (case sensitive): (b) (6)

Please contact me if you have any questions.

Sincerely,



Monty Johnson  
Environmental Engineering Manager

Enclosures

cc: see attached distribution list



# SMOKY CANYON MINE – DISTRIBUTION LIST

## REMEDIAL INVESTIGATION/FEASIBILITY STUDY

**Subject:** Final Sampling and Analysis Plan (SAP)  
Addendum 06 – Revised QAPP Tables (updated lab methods)

**Date:** November 24, 2014

<u>X</u>	Mary Kauffman (1 unbound hard copy) USDA Forest Service Caribou/Targhee National Forest Soda Springs District Office Attn: Smoky Canyon Site Record 410 E. Hooper St. Soda Springs, ID 83276	<u>X</u>	Mary Kauffman (1 hard copy) USDA Forest Service Caribou/Targhee National Forest 1405 Hollipark Drive Idaho Falls, ID 83401
<u>X</u>	James Alexander (1 CD only) USDA Office of the General Counsel 1220 SW Third Avenue Floor G, Room G002 (mail room) Portland, OR 97204	<u>X</u>	Alan Prouty, Burl Ackerman (2 hard copies) J.R. Simplot Company P.O. Box 27, One Capital Center 999 Main Street, Ste 1400 (mail room) Boise, ID 83707-0027
<u>X</u>	Wayne Crowther (1 hard copy) Idaho Dept. of Environmental Quality 444 Hospital Way, Suite 300 Pocatello, ID 83201	<u>X</u>	Monty Johnson (3 hard copies) Dennis Facer, Lori Hamann J.R. Simplot Company P.O. Box 912, 1130 West Highway 30 Pocatello, ID 83204
<u>X</u>	Colleen O'Hara-Epperly (1 hard copy) Bureau of Land Management Pocatello Field Office 4350 South Cliffs Drive Pocatello, ID 83204	<u>X</u>	Scott Lusty (4 hard copies) John Cunningham, Grant Williams, file copy J.R. Simplot Company, Smoky Canyon Mine 1890 Smoky Canyon Mine Road Afton, WY 83110
<u>X</u>	Sandi Fisher (1 hard copy) US Fish and Wildlife Service 4425 Burley Drive, Suite A Chubbuck, ID 83202	<u>X</u>	Gary Billman (1 hard copy) Idaho Department of Lands 3563 East Ririe Highway Idaho Falls, ID 83401
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<u>X</u>	Ted Yackulic (1 CD only) EPA Region 10 Office of Regional Counsel (ORC-158) 1200 Sixth Avenue Seattle, WA 98101	<u>X</u>	Susan Hanson (1 hard copy) (b) (6)
<u>X</u>	Brady Johnson (1 hard copy) Idaho Dept. of Environmental Quality 1410 North Hilton Boise, ID 83706	<u>X</u>	Doug Scott (1 CD only) CH2M Hill 59 Lilac Court Pagosa Springs, CO 81147
<u>X</u>	Rick McCormick (2 hard copies) Tim Mosko CH2M Hill 322 East Front Street Suite 200 Boise, ID 83702	<u>X</u>	Fred Charles (3 hard copies) Buz Cotton, Len Mason Formation Environmental, LLC 2500 55 <sup>th</sup> Street Suite 200 Boulder, CO 80301

**NOTE:** Each hard copy submittal includes 1 complete CD of the SAP Addenda and the complete SAP.

Table 2-2

## Summary of Calibration and QC Procedures for EPA Method 6020A (ICPMS)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section <sup>a</sup>	Data Validation Qualification <sup>b</sup>
MS tuning sample	Prior to initial calibration, solution as specified by lab's SOP.	Mass calibration < 0.1 amu from the true value; $r \geq 0.995$ . Stability: RSD < 5% for at least five replicate analyses.	Retune instrument then reanalyzing tuning solution.	Per Section II of ICP-MS NFG, except substitute with method/lab acceptance limits.	Per Section II and Table 11 in NFG, using professional judgment.
Initial calibration (ICAL) for all target analytes (minimum one standard and a blank)	Daily initial calibration prior to sample analysis	Calibration blank plus 1 or more non-zero standards; a minimum of 3 replicate integrations are required and the average shall be used.	Correct problem then repeat initial calibration.	Per Section III of ICP-MS NFG.	Per Section III and Table 13 in NFG
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source)	All analytes within $\pm 10\%$ of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Per Section III of ICP-MS NFG.	Per Section III and Table 13 in NFG
Initial Calibration Blank (ICB)	After ICV	Absolute value $\leq 2x$ MDL for each analyte. If $(2x \text{ MDL}) > \text{CRQL}$ , then use the absolute value $\leq \text{CRQL}$ as the criteria instead.	Correct problem and reanalyze.	Per Section IV of ICPMS NFG, except U at detected value if result between MDL and CRQL.	Per Section IV and Table 14 in NFG, except U at detected value if result between MDL and CRQL.
CRQL Check Standard (CRI)	Daily, after ICAL, after every 20 samples and at end of each analysis run.	The analyte(s) within $\pm 30\%$ of expected value for all analytes except Co, Mn and Zn ( $\pm 50\%$ ).	Correct problem then reanalyze.	Per Section III of ICP-MS NFG.	Per Section III and Table 13 in NFG
Interference Check Solution A & AB (ICS-A & ICS-AB)	At the beginning of an analytical run (not before the ICV) and immediately followed by a CCV/CCB.	ICS-A and ICS-AB: $\pm 3x \text{ CRQL}$ or $\pm 20\%$ (whichever is greater).	Correct problem and reanalyze.	Per Section V of ICP-MS NFG.	Per Section V and Table 15 in NFG
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	The analyte within $\pm 10\%$ of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.	Per Section III of ICP-MS NFG.	Per Section III and Table 13 in NFG
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	Absolute value $\leq 2x$ MDL for each analyte. If $(2x \text{ MDL}) > \text{CRQL}$ , then use the absolute value $\leq \text{CRQL}$ as the criteria instead.	Correct problem then reanalyze calibration blank and previous 10 samples.	Per Section IV of ICPMS NFG, except U at detected value if result between MDL and CRQL.	Per Section IV and Table 14 in NFG, except U at detected value if result between MDL and CRQL.

Table 2-2

## Summary of Calibration and QC Procedures for EPA Method 6020A (ICPMS)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section <sup>a</sup>	Data Validation Qualification <sup>b</sup>
Method Blank (or preparation blank)	One per analytical batch	Absolute value $\leq$ CRQL for each analyte	If absolute value is $>$ CRQL all sample results (excluding field blanks) must be $\geq 10\times$ the blank concentration. Otherwise, all samples associated with the blank and $< 10\times$ blank concentration must be redigested and reanalyzed.	Per Section IV of ICPMS NFG, except U at detected value if result between MDL and CRQL.	Per Section IV and Table 14 in NFG, except U at detected value if result between MDL and CRQL.
Laboratory Control Sample (LCS) or Standard Reference Material (SRM) for all analytes	One LCS/SRM per analytical batch	Aqueous/Soil/Sed LCS: 80% - 120% or vendor-specified control limits (but not wider than 80-120% recovery). Tissue SRM: vendor-specified control limits.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS/SRM and all samples in the preparation batch.	Per Section VI of ICP-MS NFG.	Per Section VI and Table 16 in NFG, using appropriate control limits
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix - not to be performed using a field blank. MSDs not required for tissues.	Laboratory-determined control limits (but not wider than 75-125% recovery and $RPD < 20$ ). MS/MSD recoveries are not applicable if the sample concentration (used for spiking) is $> 4\times$ the spike concentration.	Flag associated sample results and perform post-digestion spike addition (not required if only MSD is outside limits).	Per Section VIII of ICP-MS NFG.	Per Section VIII and Table 18 in NFG.
Post-digestion spike addition	If MS/MSD fails	Recovery within laboratory-determined control limits (but not wider than 75-125%).	Perform dilution test.	Per Section VIII of ICP-MS NFG.	Per Section VIII and Table 18 in NFG.
Analytical duplicate sample	One duplicate per every 20 samples per matrix	$RPD < 20\%$ if sample and duplicate concentrations $\geq 5\times$ CRQL. If sample and/or duplicate concentration $< 5\times$ CRQL the control limit will be a difference of $\pm$ CRQL.	Flag associated sample results.	Per Section VII of ICP-MS NFG for aqueous samples. For soil, sediment and tissue samples, control limits of $RPD < 35\%$ (if sample and duplicate concentrations are $\geq 5\times$ CRQL) or a difference of $\pm 2\times$ CRQL (if sample and/or duplicate $< 5\times$ CRQL) may be used based on professional judgment.	Per Section VII and Table 17 in NFG for aqueous samples. For soil, sediment and tissue samples, control limits of $RPD < 35\%$ (if sample and duplicate concentrations are $\geq 5\times$ CRQL) or a difference of $\pm 2\times$ CRQL (if sample and/or duplicate $< 5\times$ CRQL) may be used based on professional judgment.



Table 2-2

## Summary of Calibration and QC Procedures for EPA Method 6020A (ICPMS)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section <sup>a</sup>	Data Validation Qualification <sup>b</sup>
Field duplicate sample	Per Table 3-11 of QAPP	Not applicable	Not applicable	Per Section XI of ICP-MS NFG.	NFGs do not provide specific guidelines. Project control limits will be RPD<20% for aqueous samples (if sample and duplicate concentrations are $\geq 5 \times \text{CRQL}$ ) or a difference of $\pm \text{CRQL}$ (if sample and/or duplicate $< 5 \times \text{CRQL}$ ). Project control limits will be RPD<50% for soil/sediment samples (if sample and duplicate concentrations are $\geq 5 \times \text{CRQL}$ ) or a difference of $\pm 2 \times \text{CRQL}$ (if sample and/or duplicate $< 5 \times \text{CRQL}$ ). For field duplicates outside project control limits, J/UJ flag field duplicate pair results and use professional judgment regarding flagging other samples in SDG.
Split samples (fish samples only)	To be determined	Not applicable	Not applicable	Not applicable	An RPD<50% will be used as a project control limit. Use professional judgment for flagging (R/J/UJ).
Serial dilution (SD) test	One SD sample per every 20 samples	Fivefold dilution must agree within $\pm 10\%$ of the original determination if analyte concentration is $> 50 \times \text{MDL}$ .	Flag associated sample results.	Per Section IX of ICP-MS NFG.	Per Section IX and Table 19 in NFG
Internal Standards (IS')	Every sample; internal standards as specified by method and lab's SOP.	60% - 125% of intensity in the calibration blank.	Dilute by a factor of two and re-analyze. If IS recoveries still out, report undiluted results.	Per Section X of ICP-MS NFG, though specific internal standards that are used (and the number used) will be determined by the lab.	Per Section X and Table 20 in NFG
Concentrations between the MDL and CRQL	All samples	Not applicable	Flag as estimated value ("B" flag)	Not applicable	Not applicable

Note that specific QC procedures may vary based on the laboratory that performs the analyses.

<sup>a</sup> National Functional Guidelines (NFG) for Inorganic Data Review (USEPA, 2004).

<sup>b</sup> Refer to NFG for detailed evaluation protocols.

MDL - Method detection limit

CRQL - Contract Required Quantitation Limit. May be referred to as "PQL" - Practical Quantitation Limit or "RL" - Reporting Limit.

RPD - Relative percent difference

Table 2-3

## Summary of Calibration and QC Procedures for EPA Method 6010C (ICP)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section <sup>a</sup>	Data Validation Qualification <sup>b</sup>
Initial calibration (ICAL) for all target analytes (minimum one standard and a blank)	Daily initial calibration prior to sample analysis	Calibration blank plus 1 or more non-zero standards	Correct problem then repeat initial calibration.	Per Section II of ICP NFG.	Per Section II and Table 3 in NFG
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source)	All analytes within $\pm 10\%$ of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Per Section II of ICP NFG.	Per Section II and Table 3 in NFG
Initial Calibration Blank (ICB)	After ICV	Absolute value $\leq 2x$ MDL for each analyte. If $(2x \text{ MDL}) > \text{CRQL}$ , then use the absolute value $\leq \text{CRQL}$ as the criteria instead.	Correct problem and reanalyze.	Per Section III of ICP NFG, except U at detected value if result between MDL and CRQL.	Per Section III and Table 4 in NFG, except U at detected value if result between MDL and CRQL.
CRQL Check Standard (CRI)	Daily, after ICAL, after every 20 samples and at end of each analysis run.	The analyte(s) within $\pm 30\%$ of expected value except for Sb, Pb and Tl ( $\pm 50\%$ ).	Correct problem then reanalyze.	Per Section II of ICP NFG.	Per Section II and Table 3 in NFG
Interference Check Solution A & AB (ICS-A & ICS-AB)	At the beginning of an analytical run	ICS-A and ICS-AB: $\pm 2x \text{ CRQL}$ or $\pm 20\%$ (whichever is greater).	Correct problem and reanalyze ICS-A and ICS-AB.	Per Section IV of ICP NFG.	Per Section IV and Table 5 in NFG
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	The analyte within $\pm 10\%$ of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.	Per Section II of ICP NFG.	Per Section II and Table 3 in NFG
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	Absolute value $\leq 2x$ MDL for each analyte. If $(2x \text{ MDL}) > \text{CRQL}$ , then use the absolute value $\leq \text{CRQL}$ as the criteria instead.	Correct problem then reanalyze calibration blank and previous 10 samples.	Per Section III of ICP NFG, except U at detected value if result between MDL and CRQL.	Per Section III and Table 4 in NFG, except U at detected value if result between MDL and CRQL.
Method Blank (or preparation blank)	One per analytical batch	Absolute value $\leq \text{CRQL}$ for each analyte	If absolute value is $> \text{CRQL}$ all sample results (excluding field blanks) must be $\geq 10x$ the blank concentration. Otherwise, all samples associated with the blank and $< 10x$ blank concentration must be redigested and reanalyzed.	Per Section III of ICP NFG, except U at detected value if result between MDL and CRQL.	Per Section III and Table 4 in NFG, except U at detected value if result between MDL and CRQL.

Table 2-3

## Summary of Calibration and QC Procedures for EPA Method 6010C (ICP)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section <sup>a</sup>	Data Validation Qualification <sup>b</sup>
Laboratory Control Sample (LCS) or Standard Reference Material (SRM) for all analytes	One LCS/SRM per analytical batch	Aqueous/Soil/Sed LCS: 80-120% or vendor-specified control limits (but not wider than 80-120% recovery; except for aqueous Sb and Ag which may have other control limits). Tissue SRM: vendor-specified control limits.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS/SRM and all samples in the preparation batch.	Per Section V of ICP NFG.	Per Section V and Table 6 in NFG.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix - field blanks may not be used. MSDs not required for tissues.	Laboratory-determined control limits (but not wider than 75-125% recovery and RPD < 20). MS/MSD recoveries are not applicable if the sample concentration (used for spiking) is >4x the spike concentration.	Flag associated sample results and perform post-digestion spike addition.	Per Section VII of ICP NFG.	Per Section VII and Table 8 in NFG.
Post-digestion spike addition	If MS/MSD fails	Recovery within laboratory-determined control limits (but not wider than 75-125%).	Perform dilution test.	Per Section VII of ICP NFG.	Per Section VII and Table 8 in NFG.
Analytical duplicate sample	One duplicate per every 20 samples per matrix	RPD <20% if sample and duplicate concentrations $\geq 5 \times \text{CRQL}$ . If sample and/or duplicate concentration <5xCRQL the control limit will be a difference of $\pm \text{CRQL}$ .	Flag associated sample results.	Per Section VI of ICP NFG for aqueous samples. For soil, sediment and tissue samples, control limits of RPD <35% (if sample and duplicate concentrations are $\geq 5 \times \text{CRQL}$ ) or a difference of $\pm 2 \times \text{CRQL}$ (if sample and/or duplicate <5xCRQL) may be used based on professional judgment.	Per Section VI and Table 7 in NFG for aqueous samples. For soil, sediment and tissue samples, control limits of RPD <35% (if sample and duplicate concentrations are $\geq 5 \times \text{CRQL}$ ) or a difference of $\pm 2 \times \text{CRQL}$ (if sample and/or duplicate <5xCRQL) may be used based on professional judgment.



Table 2-3

## Summary of Calibration and QC Procedures for EPA Method 6010C (ICP)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria	Data Validation Reference Section <sup>a</sup>	Data Validation Qualification <sup>b</sup>
Field duplicate sample	Per Table 3-11 of QAPP	Not applicable	Not applicable	Per Section IX of ICP NFG.	NFGs do not provide specific guidelines. Project control limits will be $RPD < 20\%$ for aqueous samples (if sample and duplicate concentrations are $\geq 5 \times CRQL$ ) or a difference of $\pm CRQL$ (if sample and/or duplicate $< 5 \times CRQL$ ). Project control limits will be $RPD < 50\%$ for soil/sediment samples (if sample and duplicate concentrations are $\geq 5 \times CRQL$ ) or a difference of $\pm 2 \times CRQL$ (if sample and/or duplicate $< 5 \times CRQL$ ). For field duplicates outside project control limits, J/UJ flag field duplicate pair results and use professional judgment regarding flagging other samples in SDG.
Split samples (fish samples only)	To be determined	Not applicable	Not applicable	Not applicable	An $RPD < 50\%$ will be used as a project control limit. Use professional judgment for flagging (R/J/UJ).
Serial dilution (SD) test	One SD sample per every 20 samples.	Fivefold dilution must agree within $\pm 10\%$ of the original determination if analyte concentration is $> 50 \times MDL$ .	Flag associated sample results.	Per Section VIII of ICP NFG.	Per Section VIII and Table 9 in NFG.
Concentrations between the MDL and CRQL	All samples	Not applicable	Flag as estimated value ("B" flag)	Not applicable	Not applicable

Note that specific QC procedures may vary based on the laboratory that performs the analyses.

<sup>a</sup> National Functional Guidelines (NFG) for Inorganic Data Review (USEPA, 2004).

<sup>b</sup> Refer to NFG for detailed evaluation protocols.

CRQL - Contract Required Quantitation Limit. May be referred to as "PQL" - Practical Quantitation Limit or "RL" - Reporting Limit.

MDL - Method detection limit

RL - Reporting limit

Table 2-7

## Requirements for Sample Preservation and Preparation Techniques, Sample Volumes, and Holding Times

Parameter	Referenced Method	Sample Preparation Method	Preservative <sup>1</sup>	Minimum Sample Volume	Maximum Holding Time (Days)
<b>Solid Matrices (Sediment, Soil, Vegetation, Biological Tissue)</b>					
Metals and metalloids (COPCs)	EPA 6010C and EPA 6020A (ICP and ICP-MS)	Total Digestion-hot plate (M3050B) for sediment, soil and vegetation; closed vessel digestion for non-vegetation tissues	None	5 g	180
Mercury	EPA 7471A	Preparation per method 7471A	None	5 g	28
Selenium	EPA 7742 Modified or SM 3114C, AA-Hydride	Total Digestion-methods 3050B and SM 3114B for sediment and soil; method 3050B for vegetation; closed vessel digestion for non-vegetation tissues	None	5 g	180
pH	USDA No. 60 [21A]	Saturated Paste (USDA No. 60[2])	None	20 g	ASAP
Percent Solids for Soil, Sediment, and Fish	CLPSOW390, Part F, D-98, Freeze-Dry (CAS SOP/NOAA Status & Trends)	None	None	10 g	NA
Total Organic Carbon	ASA No.9 29-2.2.4 Combustion/IR	None	None	20 g	28
Fish (and other aquatic tissue) Sample Preparation	EPA 600/4-81-055	Fish Tissue Pulverization	None	Entire sample	NA
Moisture Content for Plant Tissue	M209F, Gravimetric-60C	None	None	Entire sample	NA
Plant-Tissue Sample Preparation	Homogenization (CAS SOP)	Plant Tissue Pulverization	None	Entire sample	NA
Sediment Sample Preparation	USDA No.1 ASA No.9 15-4.2.2; ASTM D422	Air Dry at 34°C and Sieve-2.0mm	None	Entire sample	NA
<b>Water Matrices (Surface Water, Groundwater)</b>					
Metals and metalloids (COPCs), Hardness	EPA 6010C and 6020A (ICP and ICP-MS)	Field filtered (dissolved), Hot Plate Digestion 3005A (6010C) or 3020A (6020A)	HNO <sub>3</sub>	500 mL	180
		Unfiltered (total); Hot Plate Digestion 3005A (6010C) or 3020A (6020A)	HNO <sub>3</sub>	500 mL	180
Chromium VI (surface water only) <sup>3</sup>	EPA 7199 <sup>3</sup>	Field filtered (dissolved); extract per method 7199	None	50 mL	1 (24 hours) <sup>3</sup>
Mercury	EPA 7470A	Field filtered (dissolved), preparation per method 7470A	HNO <sub>3</sub>	50 mL	28
		Unfiltered (total); preparation per method 7470A	HNO <sub>3</sub>	50 mL	28
Major cations (Ca, Mg, K, Na)	EPA 6010C	Field filtered (dissolved), Hot Plate Digestion 3005A	HNO <sub>3</sub>	250 mL	180
Chloride, Sulfate	EPA 300.0 (Ion Chromatography)	None	None	50 mL	28
Nitrate+nitrite, as N	EPA 353.2	None	H <sub>2</sub> SO <sub>4</sub>	50 mL	28
Alkalinity (Alkalinity, Bicarbonate Carbonate, Hydroxide), TDS, TSS	SM 2540D (TSS), SM 2540C (TDS), SM2320B (Alkalinity Titration)	None	None	100 mL	14 (Alkalinity) 7 (TDS, TSS)
Total Organic Carbon	SM 5310B	None	H <sub>2</sub> SO <sub>4</sub>	50 mL	28
Selenium <sup>2</sup>	SM3114C (AA-Hydride) <sup>2</sup>	Field filtered (dissolved), Digestion per method SM3114B	HNO <sub>3</sub>	25 mL	180
		Unfiltered (total); Digestion per method SM3114B	HNO <sub>3</sub>	25 mL	180

<sup>1</sup>In addition to the preservation listed, all samples shall be maintained at 4 ° ± 2°C or frozen (biological tissues) following collection and during shipment to the lab.

<sup>2</sup>Specific parameters are media or sample type specific, see appropriate table in Field Sampling Plan.

<sup>3</sup>Chromium speciation will only be run if a previous result for total chromium was ≥0.011 mg/L.



**Table 2-8a**  
**Achievable Laboratory Limits, Regulatory Standards, and**  
**Risk-Based Screening Values for Groundwater**

Monitoring Parameter	Analysis Method	Units	Achievable Laboratory Limits <sup>1</sup>		State of Idaho Standards Groundwater <sup>2,a</sup>	EPA MCL <sup>3</sup>		Health Comparison Values of Drinking Water <sup>4</sup>	
			RL	MDL		Primary	Secondary <sup>a</sup>	Child	Adult
Aluminum	6010C	mg/L	0.1	0.05	0.2	NA	0.05 - 0.2	20	70
Arsenic	6020A	mg/L	0.003	0.0005	0.05	0.01	NA	0.003	0.01
Barium	6020A	mg/L	0.001	0.00003	2	2	NA	NA	NA
Beryllium	6020A	mg/L	0.0002	0.000029	0.004	0.004	NA	0.02	0.07
Boron	6010C	mg/L	0.05	0.02	NA	NA	NA	0.1	0.4
Cadmium	6020A	mg/L	0.0002	0.000024	0.005	0.005	NA	0.002	0.007
Calcium	6010C	mg/L	0.05	0.02	NA	c	c	NA	NA
Chloride	300.0	mg/L	0.2	0.1	(250)	c	250	NA	NA
Chromium (total)	6020A	mg/L	0.0015	0.00023	0.1	0.1	NA	0.1	0.1
Chromium VI	7199	mg/L	0.001	0.0002	NA	NA	NA	NA	NA
Cobalt	6020A	mg/L	0.001	0.000013	NA	NA	NA	0.1	0.4
Copper	6020A	mg/L	0.001	0.000073	1.3	1.3 <sup>b</sup>	1	0.1	0.4
Iron	6010C	mg/L	0.1	0.02	(0.3)	NA	NA	NA	NA
Lead	6020A	mg/L	0.003	0.000053	0.015	0.015 <sup>b</sup>	NA	NA	NA
Magnesium	6010C	mg/L	0.1	0.02	NA	c	c	NA	NA
Manganese	6020A	mg/L	0.001	0.000021	(0.05)	NA	0.05 <sup>*</sup>	NA	NA
Mercury	7470A	mg/L	0.0002	0.00006	0.002	0.002	NA	NA	NA
Molybdenum	6020A	mg/L	0.001	0.0001	NA	NA	NA	0.05	0.2
Nickel	6020A	mg/L	0.001	0.00011	NA	NA	NA	0.2	0.7
Potassium	6010C	mg/L	0.5	0.1	NA	c	c	NA	NA
Selenium	SM 3114C	mg/L	0.002	0.0002	0.05	0.05	NA	NA	NA
	6020A	mg/L	0.003	0.00024					
Silver	6020A	mg/L	0.0001	0.000019	(0.1)	NA	0.1	0.05	0.2
Sodium	6010C	mg/L	0.5	0.05	NA	c	c	NA	NA
Sulfate	300.0	mg/L	1	0.5	(250)	NA	250	NA	NA
TDS	SM 2540C	mg/L	10	5	(500)	NA	500	NA	NA
Thallium	6020A	mg/L	0.001	0.000023	0.002	0.002	NA	NA	NA
TSS	SM 2540D	mg/L	5	2.5	NA	NA	NA	NA	NA
Uranium	6020A	mg/L	0.001	0.0000081	NA	0.03	NA	0.03	0.03
Vanadium	6020A	mg/L	0.0015	0.0003	NA	NA	NA	0.03	0.1
Zinc	6020A	mg/L	0.005	0.00048	(5)	NA	5	3	10
Antimony	6020A	mg/L	0.003	0.00022	0.006	0.006	NA	0.004	0.01
Nitrate /Nitrite as N	353.2	mg/L	0.05	0.025	10 [10/1]	10 [10/1] <sup>d</sup>	NA	NA	NA

**Notes:**

This table includes screening levels from Table 4.2-1 of the RI Report (September 2014), and is the groundwater portion of former Table 2-8 of the RI/FS SAP/QAPP.

IDAPA - Idaho Administrative Protection Agency

MDL - Method detection limit

RL - Reporting limit

TDS - total dissolved solids

mg/L - milligrams per liter

NA - not available

RSL - Regional Screening Level

TSS - total suspended solids

<sup>1</sup> RLs and MDLs are subject to change based on the laboratory capabilities at the time of sample submittal.

<sup>2</sup> State of Idaho Ground Water Quality Rule (IDAPA 58.01.11); secondary standard in parentheses.

<sup>3</sup> USEPA primary and secondary Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations, EPA

(<http://www.epa.gov/safewater/contaminants/index.html>); 9/11/2009.

<sup>4</sup> Public Health Assessment: Southeast Idaho Phosphate Mining Resource Area: Bannock, Bear Lake, Bingham, and Caribou Counties, Idaho EPA Facility ID: IDN001002245 (U.S. Department of Health and Human Services, Public Health Services, Agency for Toxic Substances and Disease Registry, 2006). Non-cancer effects only.

<sup>a</sup> Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water; these standards are not toxicity-based.

<sup>b</sup> Copper and lead MCLs are action levels.

<sup>c</sup> Calcium, chloride, magnesium, potassium, and sodium are classified as non-toxic essential minerals and do not have RSL or MCLs. Chloride does have a secondary MCL.

<sup>d</sup> Values in brackets are the individual MCL values for nitrate/nitrite. Nitrate+Nitrite RSL is based on the lesser of the Nitrate RSL and the Nitrite RSL.

<sup>\*</sup> USEPA's health advisory for manganese indicates the secondary MCL is "...more than adequate to protect human health". (USEPA, 2004, Drinking Water Health Advisory for Manganese. EPA-822-R-04-003. Washington, DC.



# Achievable Laboratory Limits, Regulatory Standards, and Risk-Based Screening Values for Surface Water

Monitoring Parameter (total or dissolved fraction for screening comparison)	Analysis Method	Units	Achievable Laboratory Limits <sup>1</sup>		National Recommended Water Quality Criteria - Aquatic Life <sup>2</sup>		Aquatic Life Secondary Values	
			RL	MDL	Acute	Chronic	Chronic	Source
Antimony (dissolved)	6020A	mg/L	0.003	0.00022	NA	NA	0.24	<sup>3</sup> USEPA 1986
Arsenic (dissolved)	6020A	mg/L	0.003	0.0005	0.34	0.15	NA	NA
Barium (total)	6020A	mg/L	0.001	0.00003	NA	NA	0.57 <sup>b</sup>	<sup>4</sup> MDEQ 2014 - FCV
Beryllium (total)	6020A	mg/L	0.0002	0.000029	NA	NA	0.01 <sup>b</sup>	<sup>4</sup> MDEQ 2014 - FCV
Cadmium (dissolved)	6020A	mg/L	0.0002	0.000024	0.002 <sup>b</sup>	0.00025 <sup>b</sup>	NA	NA
Chromium <sup>a</sup> (total)	6020A	mg/L	0.0015	0.00023	0.57 <sup>b,c</sup>	0.074 <sup>b,c</sup>	NA	NA
Cobalt (total)	6020A	mg/L	0.001	0.000013	NA	NA	0.1	<sup>4</sup> MDEQ 2014 - FCV
Copper (dissolved)	6020A	mg/L	0.001	0.000073	0.013 <sup>b</sup>	0.0090 <sup>b</sup>	NA	NA
Lead (dissolved)	6020A	mg/L	0.003	0.000053	0.065 <sup>b</sup>	0.0025 <sup>b</sup>	NA	NA
Manganese (dissolved)	6020A	mg/L	0.001	0.000021	NA	NA	1.65 <sup>a,b</sup>	<sup>5</sup> CDPHE 2009
Molybdenum (total)	6020A	mg/L	0.001	0.0001	NA	NA	3.2	<sup>4</sup> MDEQ 2014 - FCV
Nickel (dissolved)	6020A	mg/L	0.001	0.00011	0.47 <sup>b</sup>	0.052 <sup>b</sup>	NA	NA
Silver (dissolved)	6020A	mg/L	0.0001	0.000019	0.0032 <sup>b</sup>	NA	NA	NA
Thallium (total)	6020A	mg/L	0.001	0.000023	NA	NA	0.0072	<sup>4</sup> MDEQ 2014 - FCV
Uranium (total)	6020A	mg/L	0.001	0.0000081	NA	NA	1.5 <sup>b,a</sup>	<sup>5</sup> CDPHE 2009
Vanadium (total)	6020A	mg/L	0.0015	0.0003	NA	NA	0.027	<sup>4</sup> MDEQ 2014 - FCV
Zinc (dissolved)	6020A	mg/L	0.005	0.00048	0.12 <sup>b</sup>	0.12 <sup>b</sup>	NA	NA
Aluminum (dissolved)	6010C	mg/L	0.1	0.05	NA	NA	0.087	<sup>3</sup> USEPA 1986
Boron (total)	6010C	mg/L	0.05	0.02	NA	NA	7.2	<sup>4</sup> MDEQ 2014 - FCV
Calcium (total)	6010C	mg/L	0.05	0.02	NA	NA	NA	NA
Iron (dissolved)	6010C	mg/L	0.1	0.02	NA	NA	1	<sup>3</sup> USEPA 1986
Magnesium (total)	6010C	mg/L	0.1	0.02	NA	NA	g	g
Potassium (total)	6010C	mg/L	0.5	0.1	NA	NA	g	g
Sodium (total)	6010C	mg/L	0.5	0.05	NA	NA	g	g
Mercury (dissolved)	7470A	mg/L	0.0002	0.00006	0.0014	0.00077	NA	NA
Chromium VI (dissolved)	7199	mg/L	0.001	0.0002	0.016	0.011	NA	NA
Selenium (total)	SM 3114C	mg/L	0.002	0.0002	0.02 <sup>d,e</sup>	0.005 <sup>e</sup>	NA	NA
	6020A	mg/L	0.003	0.00024				
Chloride (total)	300.0	mg/L	0.2	0.1	NA	NA	g	g
Sulfate	300.0	mg/L	1	0.5	NA	NA	g	g
Nitrate /Nitrite as N	353.2	mg/L	0.05	0.025	NA	NA	NA	NA
TDS	SM 2540C	mg/L	10	5	NA	NA	1134 <sup>f</sup>	<sup>6</sup> Chapman et al. 2000
TSS	SM 2540D	mg/L	5	2.5	NA	NA	NA	NA

**Notes:**

This table includes screening levels from Table 4.2-2 of the RI Report (September 2014), and is the surface water portion of former Table 2-8 of the RI/FS SAP/QAPP.

CCC - Criteria continuous concentration (chronic criteria)

IDEQ - Idaho Department of Environmental Quality

RL - Reporting limit

CMC - Criteria maximum concentration (acute criteria)

MDL - Method detection limit

TDS - total dissolved solids

CWA - Clean Water Act

mg/L - milligrams per liter

TSS - total suspended solids

IDAPA Idaho Administrative Protection Agency<sup>1</sup>

NA - not available

<sup>1</sup> RLs and MDLs are subject to change based on the laboratory capabilities at the time of sample submittal.

<sup>2</sup> Freshwater standards from IDAPA 58.01.02.210 and from U.S. Environmental Protection Agency (USEPA). 2009. National Recommended Water Quality Criteria (NRWQC) for Priority Pollutants. EPA Office of Water, Office of Science and Technology (4304T). Available at <http://www.epa.gov/waterscience/criteria/wqcriteria.html>. Updated December 2, 2009; Acute Criteria (CMC) and Chronic Criteria (CCC).

<sup>3</sup> U.S. Environmental Protection Agency (EPA). 1986. Quality Criteria for Water 1986 ("The Gold Book"). EPA 440/5-86-001. May 1, 1986.

<sup>4</sup> Michigan Department of Environmental Quality (MDEQ). 2014. Freshwater Chronic Values (FCV) from Rule 57 Water Quality Values based on Rule 323.1057 (Toxic Substances) of the Part 4. Water Quality Standards gives procedures for calculating water quality values to protect humans, wildlife and aquatic life. Updated February 2014.

<sup>5</sup> Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Commission (WQCC). 2007. Reg. Number 32. Classifications and Numeric Standards for the Arkansas River System, updated February 2009. Available at <http://www.cdph.state.co.us/regulations/wqccregs/100232arkansasriverbasinnew.pdf>.

<sup>6</sup> Chapman, P.M., H. Bailey, and E. Canaria. 2000. Toxicity of Total Dissolved Solids Associated with Two Mine Effluents to Chironomid Larvae and Early Lifestages of Rainbow Trout. Environmental Toxicology and Chemistry: Vol. 19, No. 1, pp. 210-214.

<sup>a</sup> Criteria values for combined concentration of all chromium species.

<sup>b</sup> The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. Criteria values for other hardness may be calculated from the following:

$$\text{CMC (dissolved)} = \exp(\text{mA} [\ln(\text{hardness})] + \text{bA}) \text{ (CF)}$$

$$\text{CCC (dissolved)} = \exp(\text{mC} [\ln(\text{hardness})] + \text{bC}) \text{ (CF)}$$

<sup>c</sup> Criterion is expressed as total recoverable (unfiltered) concentration.

<sup>d</sup> The CMC for selenium =  $1/[(f1/\text{CMC1}) + (f2/\text{CMC2})]$  where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 0.1859 mg/L and 0.01282 mg/L, respectively.

<sup>e</sup> This recommended water quality criterion for selenium is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor (0.996 - CMC or 0.922 - CCC) that was used in the GLI (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A) to convert this to a value that is expressed in terms of dissolved metal.

<sup>f</sup> No observed effects level of chironomids

<sup>g</sup> No criteria available, but considered as a component in total dissolved solids (TDS)

**Table 2-9a**  
**Achievable Laboratory Limits and**  
**Risk-Based Screening Values for Sediment**

Laboratory Measurement	Analysis Method <sup>1</sup>	Reporting Limit (RL) (mg/Kg)	Method Detection Limit (MDL) <sup>1</sup> (mg/Kg)	Risk-Based Screening-Level Benchmarks						Area-Wide Background Screening Level Benchmark <sup>5</sup>
				SQAGS <sup>2</sup>	NOAA SQiRTs <sup>3</sup>				Other	
					TEC	LELs	SELs	UETs		
Aluminum	6010C	8	1.8	NA	NA	NA	NA	25500	NA	NA
Antimony	6020A	0.3	0.011	NA	NA	NA	3	NA	NA	NA
Arsenic	6020A	0.3	0.014	9.8	6	33	17	NA	NA	NA
Barium	6010C	1	0.2	20	NA	NA	NA	NA	NA	NA
Beryllium	6020A	0.02	0.0034	NA	NA	NA	NA	NA	NA	NA
Boron	6010C	4	0.48	NA	NA	NA	NA	NA	NA	NA
Cadmium	6020A	0.02	0.006	1	0.6	10	3	NA	NA	4.32
Chromium	6010C	1	0.2	43	26	110	95	NA	NA	85.3
Cobalt	6010C	2	0.4	50	NA	NA	NA	NA	NA	NA
Copper	6010C	2	0.5	32	16	110	86	NA	NA	22.6
Iron	6010C	6	1.5	NA	20000	40000	40000	NA	NA	NA
Lead	6010C	2	0.4	36	31	250	127	NA	NA	NA
Manganese	6010C	4	1	NA	460	1100	1100	NA	NA	NA
Mercury	7471A	0.033	0.006	0.18	0.2	2	0.56	NA	NA	NA
Molybdenum	6010C	1.5	0.5	NA	NA	NA	NA	NA	NA	NA
Nickel	6010C	2.5	0.5	23	16	75	43	NA	NA	37.7
Selenium	6020A/7742	0.3	0.011	NA	NA	NA	NA	NA	2 <sup>4a</sup>	2.42
Silver	6020A	0.5	0.02	1	0.5	NA	4.5	NA	NA	NA
Thallium	6020A	0.1	0.0015	NA	NA	NA	NA	NA	NA	NA
Uranium	6020A	0.1	0.00029	NA	NA	NA	NA	NA	100 <sup>4b</sup>	NA
Vanadium	6020A	0.15	0.025	NA	NA	NA	NA	NA	NA	66.9
Zinc	6010C	5	1	120	120	820	520	NA	NA	177

**Notes:**

This table includes screening levels from Table 4.2-3 of the RI Report (September 2014), and is the sediment portion of former Table 2-9 of the RI/FS SAP/QAPP.

NA = Not available; mg/Kg = milligram per kilogram

SQAGS - sediment quality assessment guidelines

SQRTs - screening quick reference tables.

TEC - Threshold Effect Concentration

SELs - Severe Effect Levels

LELs - Lowest Effect Levels

UETs - Upper Effect Levels

ARCS - Assessment and Remediation of Contaminated Sediments

<sup>1</sup> Specific methods, RLs, and MDLs are subject to change based on the laboratory capabilities at the time of sample submittal.

<sup>2</sup> MacDonald, D.D., C.G. Ingersoll, D.E. Smorong, R.A. Lindsakoog, G. Sloane, and T. Biernacki. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines (SQAGs) for Florida Inland Waters. Florida Department of Environmental Protection, Tallahassee, FL. and MacDonald, D., C. Ingersoll, and T. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Arch Environ Contam Toxicol 39: 20-21.

<sup>3</sup> U.S. National Oceanic and Atmospheric Association (NOAA). 2008. Screening Quick Reference Tables (SQiRTs). NOAA Office of Response and Restoration Division, NOAA OR&R Report 08-1, Seattle, WA. Available at [http://response.restoration.noaa.gov/book\\_shelf/122\\_NEW-SQRTs.pdf](http://response.restoration.noaa.gov/book_shelf/122_NEW-SQRTs.pdf).

<sup>4a</sup> Lemly, D.A. 2002. Selenium Assessment in Aquatic Ecosystems. A Guide for Hazard Evaluation and Water Quality Criteria. Springer - Verlag. NY. 160 pp

<sup>4b</sup> Sheppard, S.C., M.I. Sheppard, M.O. Gallerand, B. Sanipelli. 2005. Derivation of ecotoxicity thresholds for uranium. Journal of Environmental Radioactivity 79(1):55-83. PNEC - Predicted No-Effect Concentration

<sup>5</sup> Background Screening Levels were derived by calculating the 90th percentile value for each COPC as reported in the Area Wide Risk Management Plan (IDEQ, 2004). Values were calculated from results for 12 background locations (IDEQ, 2004) for the 7 COPCs listed using NCSS 2007 (Hintze, J. (2010). Number Cruncher Statistical System (NCSS 2007). NCSS, LLC. Kaysville Utah. [www.ncss.com](http://www.ncss.com).)



**Table 2-9b**  
**Achievable Laboratory Limits and**  
**Risk-Based Screening Values for Soil**

Laboratory Measurement	Analysis Method	Reporting Limit (RL) (mg/Kg)	Method Detection Limit (MDL) <sup>1</sup> (mg/Kg)	Human Health Soil Screening Levels (mg/Kg) <sup>2</sup>	Ecological Soil Screening Levels (mg/Kg) <sup>3</sup>			
				Residential	Plants	Invertebrate	Avian	Mammalian
Aluminum	6010C	8	1.8	7,700	NA	NA	NA	NA
Antimony	6020A	0.3	0.011	3.1	NA	78	NA	0.27
Arsenic	6020A	0.3	0.014	0.61	18	NA	43	46
Barium	6010C	1	0.2	1,500	NA	330	NA	2,000
Beryllium	6020A	0.02	0.0034	16	NA	40	NA	21
Boron	6010C	4	0.48	1,600	NA	NA	NA	NA
Cadmium	6020A	0.02	0.006	7	32	140	0.77	0.36
Chromium	6010C	1	0.2	12,000 <sup>a</sup>	NA	NA	26	34
Cobalt	6010C	2	0.4	2.3	13	NA	120	230
Copper	6010C	2	0.5	310	70	80	28	49
Iron	6010C	6	1.5	5,500	NA	NA	NA	NA
Lead	6010C	2	0.4	400 <sup>b</sup>	120	1,700	11	56
Manganese	3010C	4	1	180	220	450	4,300	4,000
Mercury	7471A	0.033	0.006	2.3 <sup>c</sup>	NA	NA	NA	NA
Molybdenum	6010C	1.5	0.5	39	NA	NA	NA	NA
Nickel	6010C	2.5	0.5	150	38	280	210	130
Selenium	6020A/7742	0.3	0.011	39	0.52	4.1	1.2	0.63
Silver	6020A	0.5	0.02	39	560	NA	4.2	14
Thallium	6020A	0.1	0.0015	0.78	NA	NA	NA	NA
Uranium	6020A	0.1	0.00029	24 <sup>d</sup>	NA	NA	NA	NA
Vanadium	6020A	0.15	0.025	39 <sup>e</sup>	NA	NA	7.8	280
Zinc	6020A	5	1	2,300	160	120	46	79

**Notes:**

This table includes screening levels from Table 4.2-4 of the RI Report (September 2014), and is the soil portion of former Table 2-9 of the RI/FS SAP/QAPP.  
 NA = Not available.  
 mg/Kg = milligram per kilogram.

<sup>1</sup> Specific RLs and MDLs are subject to change based on the lab capabilities at time of sample submittal.

<sup>2</sup> Residential soil screening levels from USEPA, 2013. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Developed by Oak Ridge National Laboratory under an Interagency Agreement with EPA. Available at [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/index.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm); updated November 2013. (Carcinogenic effect TR = 10<sup>-6</sup>, Non-carcinogenic effect HQ = 0.1) RSL will be used for both soils and sediments.

<sup>3</sup> Eco Soil Screening Levels from USEPA Eco SSL guidance serve as conservative estimates of minimum detection limits; U.S. Environmental Protection Agency (EPA). 2005. Guidance for Developing Ecological Soil Screening Levels (EcoSSLs). EPA Office of Solid Waste and Emergency Response (OSWER), OSWER Directive 9285.7-55. Published November 2003, Revised November 2005 and subsequent contaminant-specific EcoSSL documents.

<sup>4</sup> Selected benchmark values were based on the lowest available screening level.

<sup>a</sup> Value is for chromium III.

<sup>b</sup> Lead's soil screening concentration is based on blood lead modeling and not calculated the way other RSLs have been calculated. Therefore, the Lead RSL is used unmodified, as reported in USEPA (2010).

<sup>c</sup> Value is for mercury, inorganic salts.

<sup>d</sup> RSL were recalculated using the oral reference dose of 0.0006 mg/kg/day as used by the EPA Office of Drinking Water to develop the revised uranium MCL (EPA 2000).

<sup>e</sup> Value is for vanadium compounds.



Table 2-10

**Achievable Laboratory Limits and Risk-Based Screening Values  
Plant and Animal Tissue**

Media Types	Laboratory Measurement	Method <sup>1</sup>	Reporting Limit (RL) (mg/Kg)	Method Detection Limit (MDL) <sup>1</sup> (mg/Kg)	Target Detection Limits (=EcoSSLs/10) (mg/Kg) <sup>2</sup>	
					Avian	Mammalian
Terrestrial and Riparian Vegetation	Aluminum	6020A	2	0.4	NA	NA
	Antimony	6020A	0.05	0.02	NA	0.027
	Arsenic	6020A	0.5	0.06	4.3	4.6
	Barium	6020A	0.05	0.005	NA	200
	Beryllium	6020A	0.02	0.003	NA	2.1
	Boron	6010C	2	0.4	NA	NA
	Cadmium	6020A	0.02	0.004	0.077	0.036
	Chromium	6010C	0.5	0.2	2.6	3.4
	Cobalt	6020A	0.02	0.003	12	23
	Copper	6020A	0.1	0.08	2.8	4.9
	Iron	6010C	2	0.7	NA	NA
	Lead	6020A	0.05	0.009	1.1	5.6
	Manganese	6020A	0.05	0.03	430	400
	Mercury	7471A	0.02	0.002	NA	NA
	Molybdenum	6020A	0.05	0.02	NA	NA
	Nickel	6020A	0.2	0.03	21	13
	Selenium	7742	0.1	0.03	0.12	0.063
	Silver	6020A	0.02	0.008	0.42	1.4
	Thallium	6020A	0.02	0.003	NA	NA
	Uranium	6020A	0.02	0.006	NA	NA
Terrestrial and Aquatic Receptor Tissue	Vanadium	6010C	1	0.3	0.78	28
	Zinc	6020A	0.5	0.2	4.6	7.9
	Aluminum	6020A	2	0.9	NA	NA
	Antimony	6020A	0.05	0.02	NA	0.027
	Arsenic	6020A	0.5	0.06	4.3	4.6
	Barium	6020A	0.05	0.009	NA	200
	Beryllium	6020A	0.02	0.004	NA	2.1
	Boron	6010C	1	0.2	NA	NA
	Cadmium	6020A	0.02	0.005	0.077	0.036
	Chromium	6010C	0.2	0.08	2.6	3.4
	Cobalt	6020A	0.02	0.002	12	23
	Copper	6020A	0.1	0.03	2.8	4.9
	Iron	6010C	2	0.4	NA	NA
	Lead	6020A	0.02	0.005	1.1	5.6
	Manganese	6020A	0.05	0.02	430	400
	Mercury	7471A	0.02	0.002	NA	NA
	Molybdenum	6020A	0.05	0.02	NA	NA
	Nickel	6020A	0.2	0.02	21	13
	Selenium	7742	0.1	0.05	0.12	0.063
	Silver	6020A	0.02	0.02	0.42	1.4
	Thallium	6020A	0.02	0.002	NA	NA
	Uranium	6020A	0.02	0.002	NA	NA
	Vanadium	6010C	0.2	0.07	0.78	28
	Zinc	6020A	0.5	0.08	4.6	7.9

## Notes:

<sup>1</sup> Specific methods, RLs, and MDLs are subject to change based on the laboratory capabilities at the time of sample submittal.

<sup>2</sup> Eco Soil Screening Levels from USEPA Eco SSL guidance serve as conservative estimates of minimum detection limits; U.S. Environmental Protection Agency (EPA). 2005. Guidance for Developing Ecological Soil Screening Levels (EcoSSLs). EPA Office of Solid Waste and Emergency Response (OSWER), OSWER Directive 9285.7-55. Published November 2003, Revised November 2005 and subsequent contaminant-specific EcoSSL documents.

NA = No screening level available.

Table 2-11

## Required Frequencies for Field QC Samples

Sample Type	Method	Equipment Rinsate Blank	Field Ambient Blank	Field Duplicate
Surface Water Groundwater	6010C 6020A 7470A SM3114C 300	1/20 samples or 1 per day if < 20 samples per day	1 / 20 samples if equipment is not re-used	1 / 20 samples Or At least 1 per day by sample type
Sediment Soil Tissue*	6010C 6020A 7471A 7742 SM3114C	1/20 samples or 1 per day if < 20 samples	--	1 / 20 samples Or At least 1 per day by sample type

\*Field duplicates are not required for vegetation and other tissue samples.

Table 2-12

## Required Frequencies for Laboratory QC Analyses

Sample Type	Method	Method Blank	Laboratory Control Sample	Analytical Duplicate	Matrix Spike/Matrix Spike Duplicate Pair
Surface Water Groundwater	6010C 6020A 7470A SM3114C	1/20	1/20	1 / 20 recommended	1 pair/ 20
Sediment Soil	6010C 6020A 7471A SM3114C	1/20	1/20	1/20	1 pair/ 20
Tissue	6010C 6020A 7471A 7742	1/20	1/20 use Standard Reference Material	1/20	1 MS/20